

Contributions to the knowledge of the spheciformes fauna (Hymenoptera: Ampulicidae, Crabronidae, Sphecidae) from Vietnam

Вклад в изучение фауны сфекоидных ос (Hymenoptera: Ampulicidae, Crabronidae, Sphecidae) Вьетнама

Phong Huy Pham^{1,2}, A.V. Antropov³
ФОНГ ХАЙ ПАМ, А.В. АНТРОПОВ

¹ Institute of ecology and Biological Resources, Vietnam Academy of Science and Technology.

² Graduate University of Science and Technology, Vietnam Academy of Science and Technology 18 Hoang Quoc Viet, Nghia Do, Cau Giay, Ha Noi, Vietnam, E-mail: phong.wasp@gmail.com

³ Zoological Museum of Moscow Lomonosov State University. Bolshaya Nikitskaya str. 2, Moscow, 125009, Russia. E-mail: antropov@zmmu.msu.ru

³ Зоологический музей Московского государственного университета им. М.В. Ломоносова, Большая Никитская ул. 2, Москва 125009, Россия.

KEY WORDS. checklist, fauna, Sphecidae, Crabronidae, Vietnam.

КЛЮЧЕВЫЕ СЛОВА. список, фауна, Sphecidae, Crabronidae, Вьетнам.

ABSTRACT. Contributions to the knowledge of the Vietnamese Spheciformes fauna are presented. The genus *Liris* Fabricius consisting of eight species (*L. aurulentus* (Fabricius, 1787), *L. deplanatus* (Kohl, 1884), *L. difficilis* Tsuneki, 1983, *L. festinans* (F. Smith, 1858), *L. laboriosus* (F. Smith, 1856), *L. larriformis* (William, 1928), *L. robustoides* (William, 1928), and *L. subtessellatus* (F. Smith, 1856)), *Isodontia elsei* Hensen, 1991, and *I. nigella* (F. Smith, 1856) are reported for the first time from Vietnam. Two species of the genus *Tachysphex* (*T. changi* Tsuneki, 1967 and *T. puncticeps* Cameron, 1903), four species of the genus *Trypoxylon* (*T. maculipes* Tsuneki, 1979, *T. prominens* Tsuneki, 1979, *T. schmiedeknechtii* Kohl, 1906, and *T. sextum* Tsuneki, 1979) which are omitted in the distributional checklist produced by Pham et al. [2015], and thirteen species of other six genera recorded between 2015 and 2021 are added to a Spheciformes fauna list of Vietnam rising a total of 73 species and subspecies belonging to 3 families, 9 subfamilies, and 24 genera. Keys to species of the genus *Liris* are also produced.

РЕЗЮМЕ. Представлены результаты изучения вьетнамской фауны Spheciformes. Род *Liris* Fabricius, включающий восемь видов (*L. aurulentus* (Fabricius, 1787), *L. deplanatus* (Kohl, 1884), *L. difficilis* Tsuneki, 1983, *L. festinans* (F. Smith, 1858), *L. labouriosus* (F. Smith, 1856), *L. larriformis* (William, 1928), *L. robustoides* (William, 1928) и *L. subtessellatus* (F. Smith, 1856)), *Isodontia elsei* Hensen, 1991, и *I. nigella* (F. Smith, 1856) впервые приводится для Вьетнама.

Два вида рода *Tachysphex* (*T. changi* Tsuneki, 1967 и *T. puncticeps* Cameron, 1903), четыре вида рода *Trypoxylon* (*T. maculipes* Tsuneki, 1979, *T. prominens* Tsuneki, 1979, *T. schmiedeknechtii* Kohl, 1906, и *T. sextum* Tsuneki, 1979), которые не включены в работу Pham et al. [2015], и тринадцать видов других шести родов, зарегистрированных в период с 2015 по 2021 год, добавлены к списку фауны Spheciformes Вьетнама, в котором в общей сложности насчитывается 73 вида и подвидов, относящихся к 3 семействам, 9 подсемействам и 24 родам. Приводятся определительные таблицы видов рода *Liris*.

Introduction

Pham et al. [2015] recorded in the distributional checklist of spheciformes wasps from Vietnam 49 species and subspecies belonging to 3 families, 9 subfamilies, and 20 genera, but they omitted two species of the genus *Tachysphex*, which were reported by Krombein and Pulawski [1994] and four species of the genus *Trypoxylon*, which were reported by Tsuneki [1978, 1979]. Many reports after that time relative to records of Vietnamese spheciformes wasp species have been published [Tano, Kurokawa, 2015; Pham, 2016a,b; Pham, Dang, 2017; Dollfuss, 2016, 2017, 2020; Pham, 2018, 2019a,b; Pham et al., 2019a,b; Pham et al., 2020; Terayama et al., 2019; Schmid-Egger, Al-Jahdhami, 2021]. In the present study, we add a new genus *Liris* Fabricius consisting of eight species, two new species of the genus

Isodontia to the Vietnamese spheciformes fauna. Many crabronid wasp species that have been recorded between 2015 and 2021 are listed to the Vietnamese spheciformes fauna. The taxonomic situation of the two subspecies, *Sphex diabonicus flammitrichus* Strand, 1913 and *S. sericeus lineolus* Lepeletier, 1845 which were recorded by Tano and Kurokawa [2015], is also remarked.

Materials and Methods

The specimens examined in the present paper were collected using insect nets, Malaise traps, and trap nests in North Vietnam and Centre of Vietnam from 2001 to 2021 and deposited in the Institute of Ecology and Biological Resources (IEBR), Vietnam Academy of Science and Technology (VAST), Ha Noi, Vietnam.

Hensen [1991], Tsuneki [1983] and Li et al. [2009] were used for the identification of species of three genera, *Isodontia* Patton, *Sphex* Linnaeus, and *Liris* Fabricius. Three species of the genus *Liris* (*L. aurulentus* (Fabricius, 1787), *L. festinans* (F. Smith, 1858), and *L. subtessellatus* (F. Smith, 1856)) were determined by Dr. Wojciech J. Pulawski (California Academy of Sciences, 55 Music Concourse Drive, San Francisco, California 94118, USA). Photographic images were taken using a Nikon SMZ800N microscope camera.

Spheciformes species reported for Vietnam between 2015 and 2021 were listed along with their original publications. Information on the taxonomic history of genera and all species was taken from Pulawski [2021] and full distributions of each species examined were also taken from the same source. Provincial distribution is only for records from Vietnam.

The abbreviations of museums or institutions where the type specimens are kept are as follows. The acronyms follow Arnett's the Insect and spider collections of the world (<http://hbs.bishopmuseum.org/codens/codens-inst.html>).

BMNH	The Natural History Museum, United Kingdom, London.
BPBM	Bernice P. Bishop Museum, Honolulu, Hawaii, USA.
EIHU	Hokkaido University, Sapporo, Hokkaido, Japan.
DEI	Deutsches Entomologisches Institut, Eberswalde, Germany.
FRI	Forestry Research Institute, Beijing Agricultural University, Beijing, China.
IEBR	Institute of Ecology and Biological Resources, Vietnam Academy of Science and Technology, Hanoi, Vietnam.
KUEC	Kyushu University, Fukuoka, Japan.
MLUH	Wissenschaftsbereich Zoologie, Martin-Luther-Universität, Halle, Germany.
MNHN	Muséum National d'Histoire Naturelle, Laboratoire d'Entomologie, Paris, France.
NHMW	Naturhistorisches Museum, Zoologische Abteilung, Wien.
OSAKA	Osaka Museum of Natural History, Osaka, Japan.
OXUM	University Museum of Natural History, Oxford, United Kingdom.

RMNH	National Natuurhistorisch Museum, Leiden, Netherlands.
UOPJ	Osaka Prefecture University, Sakai, Osaka, Japan.
USNM	National Museum of Natural History, Washington D.C. USA.
ZIN	Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia.
ZMUC	University of Copenhagen, Zoological Museum, Copenhagen, Copenhagen.

Results

Family Ampulicidae

Subfamily Ampulicinae

Tribe Ampulicini

Genus *Ampulex* Jurine, 1807

1. *Ampulex difficilis* Strand, 1913

Ampulex difficilis Strand, 1913: 152, ♀, "Taiwan: Chia Prefecture: Hoozan" (Syntypes: ♀, ♂, DEI).

DISTRIBUTION. Taiwan, China, Laos, India, Vietnam: Vinh Phuc [Dollfuss, 2017].

Tribe Dolichurini

Genus *Dolichurus* Latreille, 1809

1. *Dolichurus amamiensis* Tsuneki and Iida, 1964

Dolichurus amamiensis Tsuneki and Iida, 1964: 41, ♀, "Japan: Amami Oshima Island: Koniya" (Holotype: ♀, USNM).

Dolichurus puliensis Tsuneki, 1967: 10, ♂, "Taiwan: Nantou Prefecture: Puli" (Holotype: ♂, USNM).

DISTRIBUTION. Japan, Taiwan, Thailand, Philippines, China, Malaysia, Vietnam: Dak Lak [Dollfuss, 2017].

2. *Dolichurus taprobanae* F. Smith, 1869

Dolichurus taprobanae F. Smith, 1869: 304, ♂, actually ♀, "Sri Lanka: no specific locality" (Holotype: ♀, BMNH).

Dolichurus bipunctatus Bingham, 1896: 438, ♂, "Burma: Pegu Hills" (Holotype: ♂, BMNH).

Dolichurus [sic] clavipes Cameron, 1897: 18, ♂, junior primary homonym of *Dolichurus clavipes* Dahlbom, 1829, "India: Bengal: Barrackpore 20 km north of Calcutta" (Holotype: ♂, OXUM).

Dolichurus reticulatus Cameron, 1899: 56, ♂, "India: Assam: Khasia Hills" (Holotype or syntypes: ♂, OXUM).

DISTRIBUTION. Sri Lanka, Burma, India, Indonesia, Laos, Malaysia, Thailand, China, Vietnam: Dak Lak [Dollfuss, 2017].

Family Sphecidae

Subfamily Sceliphrinae

Tribe Sceliphriini

Genus *Chalybion* Dahlbom, 1843

1. *Chalybion bengalense* (Dahlbom, 1845)

Sphex violaceus Fabricius, 1775: 346, ♀, ♂, "South Africa: Cape of Good Hope" (Lectotype: ♀, ZMUC).

? *Sphex ferus* Drury, 1782: 57, ♀, "China: no specific locality (lost)".

? *Sphex chrysis nitidulus* Christ, 1791: 310, sex not indicated, "incorrect original termination", (Holotype or syntypes: origin not indicated (lost)).

Pelopoëus bengalense Dahlbom, 1845: 433, ♀, ♂, "India: Bengal: no specific locality", (Holotype or syntypes: ♀, Lund).

Pelopoëus convexus F. Smith, 1876: 449, ♂, "Mascarenes: Rodriguez island" (syntypes: ♂, BMNH).

DISTRIBUTION. South Africa, Tanzania, Madagasca, Mascarenes, Seychelles islands, Ethiopia, Yemen, Maldives, Socotra, Eritrea, Mozambique, Bangladesh, Iraq, Egypt, Greece, Nepal, Italy, French Polynesia, Sri Lanka, India, Burma, Malaysia, Singapore, Thailand, China, Taiwan, Japan, Volcano Island, Philippines, Borneo, Java, Indonesia, Ternate, Misool, Sulawesi, Timor, Gilbert Island, Guam Island, Lesser Sunda Island, Chagos Archipelago, Australia, United State, Vietnam: Da Nang [Tano, Kurokawa, 2015]; Sai Gon, Vung Tau [Dollfuss, 2016]; Ha Noi, Thai Binh, Vinh Phuc, Nam Dinh, Son La, Hoa Binh, Ninh Binh, Thai Nguyen, Hung Yen, Quang Ninh, Bac Ninh, Lao Cai, Hai Duong, Phu Tho, Thanh Hoa, Nghe An, Quang Ngai, Kon Tum, Dak Lak, Yen Bai [Pham, 2018; Pham, 2019a; Pham et al., 2019a,b].

2. *Chalybion malignum* Kohl, 1906

Sceliphron malignum Kohl, 1906: 192, ♀, “Sri Lanka: no specific locality” (Holotype: ♀, NHMW).

Chalybion malignum Bohart and Menke, 1976: 103 (new combination, in checklist of world Sphecidae).

Sceliphron horni Strand, 1915: 91, ♀, “Sri Lanka: Pankulam” (Holotype: ♀, DEI). Synonymized with *Sceliphron malignum* by Kohl, 1918: 74.

DISTRIBUTION. Sri Lanka, India, Burma, Malaysia, Indonesia, China, Vietnam: Hoa Binh, Vinh Phuc, Thai Nguyen [Pham, Dang, 2017].

3. *Chalybion tanvinhense* Pham and Ohl, 2019

Chalybion tanvinhense Pham and Ohl in Pham, Ohl and Truong, 2019: 205, ♀, ♂ (as *tanvinhensis*, incorrect original ending), “Vietnam: Hòa Bình Province: Lương Sơn District: Tân Vinh” (Holotype: ♀, IEBR).

DISTRIBUTION. Vietnam: Hoa Binh [Pham et al., 2019b].

Genus *Sceliphron* Klug, 1801

1. *Sceliphron deforme* (F. Smith, 1856)

Pelopoeus deformatis F. Smith, 1856: 231, ♀, “North China: no specific locality” (Lectotype: ♀, BMNH).

Sceliphron deforme taiwanum Tsuneki, 1971: 6, ♀, ♂, “Taiwan: Taitung Prefecture: Chulu” (Holotype: ♀, USNM).

DISTRIBUTION. China: Hong Kong, Japan, India, Korea, Montenegro, Taiwan, Russia, Tajikistan, Philippines, Mongolia, Southeast Kazakhstan, Myanmar, Thailand, Laos, Vietnam: Ht. Tonkin (= North of Vietnam currently), Hoabinh (= Hoa Binh Province currently), Phuong Lom [Hensen, 1987; Pham, 2016a]; North Vietnam [Četković et al., 2011], Vinh Phuc (Tam Dao National Park) [Dollfuss, 2016], Thai Nguyen, Vinh Phuc [Pham et al., 2019a].

2. *Sceliphron javanum*

(Lepeletier de Saint Fargeau, 1845)

Pelopaeus javanus Lepeletier de Saint Fargeau, 1845: 309, ♀ (as *Javanus*, incorrect original capitalization), “Indonesia: Java: no specific locality” (Holotype: ♀, M. Spinola collection, Torino).

DISTRIBUTION. Indonesia, Malaysia, China, India, Sri Lanka, Thailand, Cambodia, Nepal, Laos, Vietnam: Done Nat. Prov (= Dong Nai province), Phan Rang (Ninh Thuan province), Vung Tau (Ba Ria-Vung Tau province) [Dollfuss, 2016].

Subfamily Ammophilinae

Genus *Ammophila* Kirby, 1798

1. *Ammophila globifrontalis* Li and Yang, 1995

Ammophila globifrontalis Li and Yang, 1995: 574, ♀, ♂, “China: Guangxi Province: Nanning” (Holotype: ♀, FRI).

DISTRIBUTION. China, Vietnam: Hoa Binh [Pham et al., 2020].

Subfamily Sphecinae

Tribe Sphecini

Genus *Isodontia* Patton, 1880

1. *Isodontia aurifrons* F. Smith, 1859

Sphex aurifrons F. Smith, 1859: 157, ♀, “Indonesia: Maluku: Island of Aru” (Lectotype: ♀, OXUM).

Sphex morosus F. Smith, 1860: 122, ♂ (as *morosa*, incorrect original termination).

Sphex volatilis F. Smith, 1860: 122, ♂, “Indonesia: Moluccas: Batjan Islands (now Bacan): no specific locality” (Holotype: ♂, OXUM).

Sphex triodon Kohl, 1890: 377, ♂, “Indonesia: Java: no specific locality” (Lectotype: ♂, NHMW).

Sphex abditus Kohl, 1895: 51, ♀, “India: Sikkim?” (Holotype: ♀, NHMW).

Sphex abditus st. *nugenti* R. Turner, 1910a:345, ♀, “Australia: Queensland: Cairns” (Holotype or syntypes: ♀, BMNH).

DISTRIBUTION. Indonesia, India, New Guinea, Australia, China, Laos, Malaysia, Philippines, Sri Lanka, Thailand, Vietnam: Vinh Phuc [Pham et al., 2019a].

2. *Isodontia elsei* Hensen, 1991

Isodontia elsei Hensen, 1991: 19, ♀, ♂, “Indonesia: Sulawesi: “Rosenberg, Toelabella” (Holotype: ♂, RMNH).

SPECIMENS EXAMINED: VIETNAM: Son La: 2♀, Son La city, 15.vi–5.vii.2018, Malaise trap, Coll. K.D. Long.

DISTRIBUTION. Indonesia, Vietnam: Son La (new record).

3. *Isodontia nigella* (F. Smith, 1856)

Sphex nigellus F. Smith, 1856: 255, ♀, ♂ (as *nigella*, incorrect original termination), “China: Shanghai” (Syntypes: ♀, BMNH).

Sphex xanthognathus Pérez, 1905: 151, ♂, “Japan: Yokohama” (Holotype or syntypes: ♂, MNHN).

SPECIMENS EXAMINED: VIETNAM: Hoa Binh: 4♀, 2♂, Thuong Tien Nature Reserve, Kim Boi, 5.v–5.x.2012, Malaise trap, Coll. K.D. Long. Ninh Binh: 1♀, 1♂, Gia Sinh, Gia Vien, 24.vi.2017, insect nets, Coll. Ph.H. Pham.

DISTRIBUTION. China, India, Australia, New Guinea, Japan, Thailand, Taiwan, Korea, Russia, Vietnam: Hoa Binh, Ninh Binh (new records).

4. *Isodontia vanlinhi* Pham, 2016

Isodontia vanlinhi Pham, 2016: 64, ♀, ♂, “Vietnam: Thai Binh Province: Hung Ha: Hong Minh at 20°35'N, 106°08'E” (Holotype: ♀, IEBR).

DISTRIBUTION. Vietnam: Thai Binh [Pham, 2016b].

Genus *Sphex* Linnaeus, 1758

1. *Sphex diabolicus* F. Smith, 1858

Sphex diabolicus F. Smith, 1858: 100, ♀, “Malaysia: Sarawak, no specific locality” (Lectotype: ♀, OXUM).

Sphex fulvohirtus Bingham, 1890: 242, ♀, “Sri Lanka: Pundaluya” (Holotype: ♀, BMNH).

Sphex flammitrichus Strand, 1913: 83, ♀, ♂, “Taiwan: Kankau” (Lectotype: ♀, DEI).

Sphex umbrosus var. *aureopilosus* Berland, 1928: 330, ♀, ♂, “Vietnam: Ba-Cha in former Tonkin” (Lectotype: ♂, MNHN).

SPECIMEN EXAMINED: VIETNAM: Ha Noi: 8♀, 15♂, Hoa Lac, Thach That, Ha Tay (currently Ha Noi), 5-15.v.2002, Malaise trap, Coll. K.D. Long.

DISTRIBUTION. Malaysia, Indonesia, New Guinea, Philippines, India, Laos, China: Hong Kong, Sri Lanka, Taiwan, Korea, Japan, Vietnam: Ba-Cha in former Tonkin (= maybe part of Sa Pa District, Lao Cai Province currently) [Berland, 1928]; Ha Noi; Thuan Ho Prov., Phan Rang [Dollfuss, 2008], Da Nang [Tano, Kurokawa, 2015].

REMARKS. Tano and Kurokawa [2015] recorded this species for Vietnam under the subspecies *S. diabonicus flammitrichus* Strand, but Hensen [1991] synonymized it under the nominate species *S. diabonicus* F. Smith.

2. *Sphex sericeus* (Fabricius, 1804)

Sphex aurulentus Fabricius, 1793: 201, sex not indicated, “India: Tranquebar” (Holotype or syntypes, depository unknown).

Pepsis sericeus Fabricius, 1804: 211, sex not indicated, “Lectotype, ♀, in maris pacifici Insulis” (Lectotype: ♀, ZMUC).

Sphex fabricii Dahlbom, 1843: 27, ♀, “India: Tamil Nadu: Tranquebar” (Syntypes: ♀, depository unknown).

Sphex lineolus Lepeletier, 1845: 353, ♂, “Indonesia: Java, no specific locality” (Holotype or syntypes: ♂; M. Spinola collection, Torino).

Sphex ferrugineus Lepeletier, 1845: 345, ♀, “sans patrie mais exotique” (Holotype or syntypes: ♀, originally Audinet-Serville collection, now?).

Sphex ferox F. Smith, 1862: 55, ♂, “Indonesia: Ambon and Sulawesi, no specific localities” (Syntypes, BMNH, OXUM).

Sphex lepeletierii Saussure, 1867: 40, ♀, “Indonesia: Java, Batavia, now Djakarta” (Holotype or syntypes: ♀, NHMW).

Sphex godeffroyi Saussure, 1869: 57, ♀, “Australia: Cape York, no specific locality” (Museum Hamburg, destroyed in World War II).

Sphex aurifex F. Smith, 1873: 460, ♀, “Australia: Western Australia, Champion Bay” (Holotype: ♀, BMNH).

Sphex aurulentus var. *pallidehirtus* Kohl, 1890: 393, ♂, “Papua New Guinea: Port Moresby and Indonesia: Ambon” (Syntypes, NHMW).

Sphex rugosus Matsumura, 1912: 176, 177, Junior primary homonym of *Sphex rugosus* De Geer, 1773, “Taiwan: Horisha, Koshun” (Holotype or syntypes, depository?).

Sphex lineolus wegneri van der Vecht, Krombein, 1955: 39, ♀, ♂, “Indonesia: Kalimantan, Samarinda, Muara Kaman” (Holotype: ♂, RMNH).

Sphex sericeus nigrescens van der Vecht, Krombein, 1955: 39, ♀, ♂, “Philippines: Luzon, Los Banos” (Holotype: ♀, USNM).

Sphex sericeus ferocior van der Vecht, Krombein, 1955: 40, Substitute name for *Sphex ferox* F. Smith.

Sphex stueberii van der Vecht, Krombein, 1955: 42, ♀, ♂, “Indonesia: Irian Jaya, Hollandia, now Jayapura” (Holotype: ♀, RMNH).

SPECIMENS EXAMINED: VIETNAM: Ninh Binh: 2♀, Gia Sinh, Gia Vien, 24.vi.2017, insect net, Coll. Ph.H. Pham. Vinh Phuc: 2♀, Me Linh Station for Biodiversity, Me Linh, 31.v.2019, Coll. Ph.H. Pham. Hoa Binh: 1♀, Tan Vinh, Luong Son, 26.vii.2019, Coll. Ph.H. Pham.

DISTRIBUTION. India, Sri Lanka, Laos, Myanmar, Cambodia, Malaysia, Philippines, Thailand, Indonesia, China: Hong Kong, Taiwan, Japan, Australia, Yemen, Timor, Vietnam: ? [Barthélémy, 2014], Quang Nam [Tano, Kurokawa, 2015], Ninh Binh, Hoa Binh, Vinh Phuc (new records).

REMARKS. Tano, Kurokawa [2015] recorded this species for Vietnam under the subspecies *S. sericeus lineolus* Lepeletier, but Kohl [1885] synonymized it under the nominate species *S. sericeus* (Fabricius).

Family Crabronidae

Subfamily Crabroninae

Tribe Crabronini

Genus *Ectemnius* Dahlbom, 1845

1. *Ectemnius flavohirtus* Tsuneki, 1954

Ectemnius flavohirtus Tsuneki, 1954: 43, ♀, ♂, “Japan: Ishikawa Prefecture: Mount Haku” (Holotype: ♂, Hyogo Museum).

DISTRIBUTION. Japan, Taiwan, China, Vietnam: Thua Thien Hue (Bach Ma National Park) [Tano, Kurokawa, 2015].

Genus *Rhopalum* Risso, 1826

1. *Rhopalum babe*

Terayama, Tano, and Kurokawa, 2019

Rhopalum babe Terayama, Tano, and Kurokawa, 2019: 1, ♀, “Vietnam: Bac Can Province: Babe” (Holotype: ♀, OSAKA).

DISTRIBUTION. Vietnam: Bac Can [Terayama et al., 2019].

Tribe Larrini

Genus *Liris* Fabricius, 1804

KEY TO FEMALES

(Females of *L. laboriosus* (F. Smith) are unknown)

1. Outer margin of mandible rather shallowly notched; head and thorax with golden pubescence; scape, pedicel, and legs except basal portions ferruginous; wings purplish dark brown; body length 14–20 mm *Liris aurulentus* (Fabricius)
- Outer margin of mandible markedly deeply notched 2
2. Disc of pygidium with a bare and polished wedge-shaped area enlarging from base to middle; pygidial setae black; body length 10 mm *Liris robustoides* (William)
- Disc of pygidium without bare and polished wedge-shaped area 3
3. Mesopleuron shining and punctate; pronotum in middle highly raised only nearly mesoscutum; body length 6–9 mm *Liris festinans* (F. Smith)
- Mesopleuron coriaceous or dull; pronotum in middle markedly depressed only below mesoscutum 4
4. Hind femora and all tibiae reddish; propodeum without lateral carinae; body length 11 mm *Liris larriformis* (William)
- All tibiae black 5
5. Setae on head, thorax and pile bands on metasomal sternum golden; metasomal sternum with carina extending from near base to middle; body length 15 mm *Liris deplanatus* (Kohl)
- Setae on head, thorax and metasomal bands of pile silvery 6
6. Anterior bevel of clypeus lobe impunctate and polished; body light; body length 10–13 mm *Liris difficilis* Tsuneki
- Anterior bevel of clypeus lobe punctate and dull; body dull; body length 10–13 mm .. *Liris subtessellatus* (F. Smith)

KEY TO MALES

(Males of *L. deplanatus* (Kohl) and *L. robustoides* William are unknown)

1. Outer margin of mandible shallowly notched; head and thorax with golden pubescence; scape, pedicel, and legs except basal portions ferruginous; wings purplish dark brown; body length 11–17 mm *Liris aurulentus* (Fabricius)
- Outer margin of mandible deeply notched 2
2. Mesopleuron shining and punctate; pronotum in middle highly raised only nearly mesoscutum; body length 5–7 mm *Liris festinans* (F. Smith)
- Mesopleuron coriaceous; pronotum in middle markedly depressed only below mesoscutum 3
3. Hind femora and all tibiae reddish; body length 8–9 mm *Liris larriformis* (William)
- All tibiae not red 4
4. Apical margin of median lobe of clypeus truncate and wide; head and thorax with silvery gold pubescence; body length 11–12 mm *Liris laboriosus* (F. Smith)
- Apical margin of median lobe of clypeus markedly round-

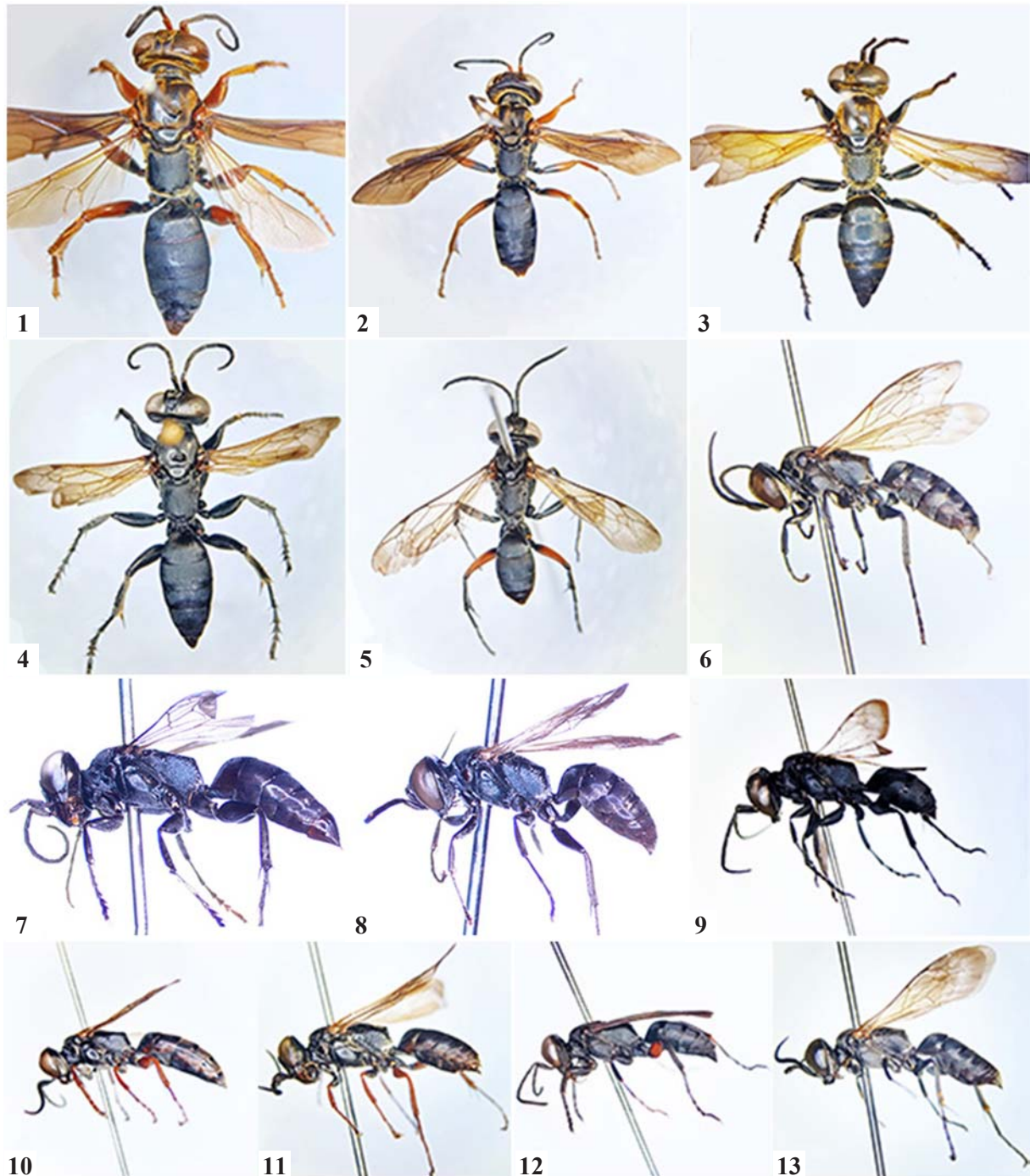
- ed out 5
 5. Outer margin of fore femur somewhat excavated; anterior bevel of clypeus lobe impunctate and polished; body light; body length 7–10 mm *Liris difficilis* Tsuneki
 — Outer margin of fore femur distinctly excavated; anterior bevel of clypeus lobe punctate; body dull, body length 7–11 mm *Liris subtessellatus* (F. Smith)

1. *Liris aurulentus* (Fabricius, 1787)

Figs 1–2.

Sphex aurulentus Fabricius, 1787: 274, sex not indicated, “China: no specific locality” (Holotype or syntypes, depository unknown).

Sphex auratus Fabricius, 1787: 276, sex not indicated, “India: no specific locality” (Holotype: ♀, ZMUC).



Figs 1–13. Habitus of eight *Liris* species from Vietnam: 1–2 — *L. aurulentus*; 3 — *L. deplanatus*; 4–5 — *L. difficilis*; 6 — *L. laboriosus*; 7–8 — *L. festinans*; 9 — *L. robustoides*; 10–11 — *L. larriformis*; 12–13 — *L. subtessellatus*; 1, 3–4, 7, 9–10, 12 — females; 2, 5–6, 8, 11, 13 — males.

Рис. 1–13. Внешний вид восьми видов рода *Liris* из Вьетнама: 1–2 — *L. aurulentus*; 3 — *L. deplanatus*; 4–5 — *L. difficilis*; 6 — *L. laboriosus*; 7–8 — *L. festinans*; 9 — *L. robustoides*; 10–11 — *L. larriformis*; 12–13 — *L. subtessellatus*; 1, 3–4, 7, 9–10, 12 — самки; 2, 5–6, 8, 11, 13 — самцы.

Tachytes opulentus Lepeletier de Saint Fargeau, 1845: 246, ♀, ♂, “Indonesia: Java: no specific locality” (Syntypes: ♀, ♂, M. Spinola collection, Torino).

Tachytes auropilosus Rohwer, 1911: 484, ♀, “Taiwan: Hor-isha” (Holotype: ♀, USNM).

Tachytes sinensis var. *purpureipennis* Matsumura and Uchida, 1926: 42, ♀, ♂, “Japan: Okinawa: Okinawa-honto, Ishigakijima” (Syntypes: ♀, ♂, EIHU).

SPECIMENS EXAMINED: VIETNAM: Ha Noi: 2♀, Lien Mac, Bac Tu Liem, 1.v.2017, 15.x.2017, sand, Coll. Ph.H. Pham; 1♀, Van Hoa, Ba Vi, 7.1.2020, Coll. Ph.H. Pham; 1♀, Bai Giua Song Hong, Long Bien, 1–10.vii.2012, Malaise trap, Coll. H.T. Dang; 1♂, Mieu Mon, Chuong My, 18.ix.2017, Coll. Ph.H. Pham; 1♂, Nghia Do, Cau Giay, 20.xi.2016, Coll. Ph.H. Pham; 1♂, My Dinh, Nam Tu Liem, 11.iii.2021, Coll. Ph.H. Pham; 5♂, Co Nhue, Bac Tu Liem, 5.i.2016, 2.xii.2015, 13.xii.2015, Coll. Ph.H. Pham; 1♀, Hoa Lac, Thach That, Ha Tay (= Ha Noi currently), 5–21.ii.2002, Malaise trap, Thai Binh: 1♂, Hong Minh, Hung Ha, 10.vii.2017, Coll. Ph.H. Pham; 1♂, Hung Nhan, Hung Ha, 25.vi.2013, Coll. Ph.H. Pham. Son La: 2♀, Son La city, 20–30.viii.2017, Malaise trap, Coll. L.D. Khuat. 4♀, 1♂, Kho Hong, Chieng Xuan, 13.vi.2018 and 26.viii.2018, Coll. Ph.H. Pham; 1♂, Ban Chieu, Muong Thai, Phu Yen, 11.viii.2017, Coll. Ph.H. Pham. Hoa Binh: 1♀, Bao Hieu, Yen Thuy, 5.viii.2017, Coll. Ph.H. Pham; 1♀, Kim Son, Kim Boi, 14.vi–20.vii.2019, Malaise trap, Coll. Ph.H. Pham. Nghe An: 1♂, Cua Lo town, 29.vi.2017, Coll. Ph.H. Pham. Bac Giang: 1♀, Son Dong, An Lac, Dong Bay, 12.viii.2012, Coll. H.T. Dang. Tuyen Quang: 1♂, Nam Nuong, Phu Luu, Ham Yen, 28.x.2018, Coll. L.V. Tuan. Ninh Binh: 1♀, Ninh Binh city, 20.vi.2017, Coll. Ph.H. Pham.

DISTRIBUTION. China, Indonesia, India, Philippines, Malaysia, Africa, Myanmar, Eritrea, Japan, Korea, Taiwan, Thailand, Sri Lanka, New Guinea, Indonesia, Vietnam: Ha Noi, Hoa Binh, Thai Binh, Son La, Tuyen Quang, Nghe An, Bac Giang, Ninh Binh.

2. *Liris deplanatus* (Kohl, 1884)

Fig. 3.

Notogonia deplanata Kohl, 1884: 358, ♀, “Sri Lanka: no specific locality” (Holotype or syntypes: ♀, NHMW).

Chrysolarra appendiculata Cameron, 1901: 118, ♀, “India: Assam: Khasia Hills” (Holotype or syntypes: ♀ OXUM).

Chrysolarra aureosericea Cameron, 1901: 119, ♀, “India: Assam: Khasia Hills” (Syntypes: ♀, OXUM).

Chrysolarra japonica Cameron, 1901: 120, ♀, “Japan: no specific locality” (Holotype or syntypes: ♀ BMNH).

Tachytes fulvopilosus Cameron, 1904: 297, ♀, “India: Simla or Khasia” (Holotype or syntypes: ♀, OXUM).

SPECIMENS EXAMINED: VIETNAM: Son La: 1♀, Copia Nature Reserve, 15.v.2017, Coll. Ph.H. Pham.

DISTRIBUTION. Sri Lanka, Myanmar, Indonesia, Philippines, Japan, India, Vietnam: Son La.

3. *Liris difficilis* Tsuneki, 1983

Figs 4–5.

Liris difficilis Tsuneki, 1983: 4, ♀, ♂, “Taiwan: Yangmingshan” (Holotype: ♂, USNM).

SPECIMENS EXAMINED: VIETNAM: Hoa Binh: 2♀, Dong Suong, Thanh Lap, Thanh Luong, 3–13.viii.2017, Malaise Trap, Coll. Ph.H. Pham; 1♂, My Tan, Tan Thanh, Luong Son, 27.v–27.vi.2019, Malaise trap, Coll. Ph.H. Pham. Tuyen Quang: 1♂, Na Hang, 5–15.iii.2018, Malaise trap, Coll. K.D. Long. Vinh Phuc: 1♀, Ngoc Thach, Me Linh, 23.v–7.vi.2001, Malaise trap, Coll. K.D. Long. Ha Noi: 1♀, 1♂, Thuy Xuan Tien, Chuong My, 20.viii.2017, Coll. Ph.H. Pham. Son La: 1♀, Copia Nature Reserve, 14.v.2017, Coll. Ph.H. Pham; 2♀, 1♂, Nong Truong Town, Moc Chau, 7.vi.2019, Coll. Ph.H. Pham; 3♀, 1♂, Son La city, 10.vi–15.xii.2017, Malaise trap, Coll. K.D. Long. Nghe An: 1♂, Cua Lo town, 29.vi.2017, Coll. Ph.H. Pham. Ninh Binh: 3♀, Cuc Phuong National Park, 4.viii.2017, Coll. Ph.H. Pham. Thai Nguyen: 1♀, 1♂, Huu Lien, Huu Lung, 12.vi and 15.vii.2019, Coll. H.T. Dang. Nam Dinh: 1♀, Xuan Thuy National Park, Xuan Thuy, 15.vi.2013, Coll. Ph.H. Pham.

DISTRIBUTION. Taiwan, Japan, China, Philippines, Thailand, Korea, Malaysia, Papua New Guinea, Vietnam: Hoa Binh, Tuyen Quang, Vinh Phuc, Ha Noi, Son La, Nghe An, Thai Nguyen, Ninh Binh.

REMARKS. There are two colour types of *L. difficilis* in Vietnam are recorded, the colour type of the black hind femur and the colour type of the red hind femur.

4. *Liris festinans* (F. Smith, 1858)

Figs 7–8.

Larrada festinans F. Smith, 1858: 17, ♀, ♂, “Indonesia: Celebes, now Sulawesi: no specific locality” (Syntypes: ♀, ♂, BMNH).

Liris trifasciatus Tsuneki, 1974: 607, ♂, “Thailand: Bangkok” (Holotype: ♂, T. Tano collection, Fukui).

SPECIMENS EXAMINED: VIETNAM: Nam Dinh: 1♀, Xuan Thuy National Park, 11.v.2016, Coll. Ph.H. Pham. Ha Noi: 5♀, Hoa Lac, Thach That, Ha Tay (Ha Noi currently), 5–25.vii.2002, Malaise trap, Coll. K.D. Long; 1♀, Xuan Mai, Hoa Binh (Xuan Mai, Ha Noi currently), 15.viii.2010, Coll. Ph.H. Pham; 3♀, Co Nhue, Bac Tu Liem, 13.xii.2015, 2.xii.2015, 16.vi.2019, Coll. Ph.H. Pham. Ha Noi: 2♀, Da Ton, Gia Lam, 25.viii–5.ix.2001, 5–15.xi.2001, Malaise trap, Coll. K.D. Long; 2♀, 1♂, Lien Mac, Bac Tu Liem, 27.viii.2017, 24.xi.2018, Coll. Ph.H. Pham. Thai Binh: 1♂, Dong Hoang, Tien Hai, 30.vii.2018, Coll. Ph.H. Pham; 1♀, Dong Minh, Tien Hai, 12.vii.2017, Coll. Ph.H. Pham; 1♀, 1♂, Hong Minh, Hung Ha, 10.vii.2017, Coll. Ph.H. Pham. Vinh Phuc: 1♀, Me Linh Station for Biodiversity, Me Linh, 1.vi.2018, Coll. Ph.H. Pham. Hoa Binh: 1♀, Bao Hieu, Yen Thuy, 5.viii.2017, Coll. Ph.H. Pham; 1♀, Mai Chau town, Mai Chau, 5–10.v.2010, Malaise trap, Coll. K.D. Long; 1♀, Hang Kia, Mai Chau, 22.x.2018, Coll. Ph.H. Pham; 7♀, 1♂, Da Phuc, Yen Thuy, 20.iv–30.x.2002, Malaise trap, Coll. K.D. Long; 1♀, 1♂, Lac village, Mai Chau, 12.vi.2018, Coll. Ph.H. Pham; 1♀, 1♂, Luong Son, 10–25.viii.2018, Malaise trap, Coll. H.T. Dang. Nghe An: 1♀, 4♂, Cua Lo town, 29.vi–2.vii.2017, Coll. Ph.H. Pham. Lao Cai: 1♀, Sa Pa town, 19.ix.2017, Coll. Ph.H. Pham. Son La: 2♀, Son La city, 1–15.v.2017 and 20–30.viii.2017, Malaise trap, Coll. K.D. Long; 1♀, Kho Hong, Chieng Xuan, Van Ho, 26.viii.2018, Coll. Ph.H. Pham; 3♀, Nong Truong Town, Moc Chau, 7.vi.2019, Coll. Ph.H. Pham. Ninh Binh: 1♀, Thung Den Tran, Trang An, 22.vi.2017, Coll. Ph.H. Pham. Thai Nguyen: 3♀, 1♂, Dai Tu, 20.xii.2006, 1–5.vii.2007, 5–10.v.2008, 15.vii.2017, Malaise trap, Coll. H.T. Dang.

DISTRIBUTION. Indonesia, Papua New Guinea, Japan, Philippines, New Caledonia, Australia, China, Afghanistan, Turkey, Iran, Thailand, Vietnam: Ha Noi, Thai Binh, Hoa Binh, Nghe An, Lao Cai, Son La, Ninh Binh, Thai Nguyen.

5. *Liris laboriosus* (F. Smith, 1856)

Fig. 6.

Larrada laboriosa F. Smith, 1856: 278, ♀, “Philippines: no specific locality” Syntypes: ♀, BMNH).

Notogonia crawfordi Rohwer, 1910: 659, ♀, “Philippines, Luzon, Los Baños” (Holotype: ♀, USNM).

SPECIMENS EXAMINED: VIETNAM: Ha Noi: 2♂, Hoa Lac, Thach That, Ha Tay (Ha Noi currently), 25.iv–5.v.2002, 5–15.vii.2002, Malaise trap, Tea garden, Coll. K.D. Long.

DISTRIBUTION. Philippines, Burma, Malaysia, Taiwan, Thailand, India, China, Vietnam: Ha Noi.

6. *Liris larriformis* (William, 1928)

Figs 10–11.

Notogonidea larriformis William, 1928: 73, ♀, ♂, “Philippines: Philippines, Luzon, Los Baños” (Holotype: ♀, BPBM).

SPECIMENS EXAMINED: VIETNAM: Ha Noi: 1♀, 1♂, Hoa Lac, Thach That, Ha Tay (Ha Noi currently), 5–15.vi.2002, 15–25.ix.2002, Malaise trap, Tea garden, Coll. K.D. Long. Son La: 1♂, Son La city, 20.v.2017, Malaise trap, Coll. K.D. Long.

DISTRIBUTION. Philippines, Thailand, Taiwan, China, Vietnam: Ha Noi, Son La.

7. *Liris robustoides* (William, 1928)

Fig. 9.

Notogonidea robustoides Williams, 1928: 77, ♀, ♂, "Philippines: Philippines, Luzon, Los Baños" (Holotype: ♀, BPBM).

SPECIMENS EXAMINED: VIETNAM: Vinh Phuc: 1♀, Me Linh Station for Biodiversity, Me Linh, 3.vi.2018, Coll. Ph.H. Pham.

DISTRIBUTION. Philippines, Vietnam: Vinh Phuc.

8. *Liris subtessellatus* (F. Smith, 1856)

Figs 12–13.

Larrada subtessellata F. Smith, 1856: 277, ♀, "India, Sumatra, Java" (Syntypes: ♀, BMNH).

Larrada exilipes F. Smith, 1856: 278, ♂, "Northern India (possibly Pakistan): no specific locality" (Syntypes: ♂, BMNH).

Larrada docilis F. Smith, 1873: 192, ♀, ♂, "Japan: Hyogo: Hakodate" (Lectotype: ♀, BMNH).

Larrada tisiphone F. Smith, 1873: 192, ♀, "Japan: Nagasaki" (Lectotype: ♀, BMNH).

Notogonidea manilensis Rohwer, 1910: 659, ♂, "Philippines: Luzon: Manila" (Holotype: ♂, USNM).

Notogonia insularis Cameron, 1913b: 81, ♂, "Indonesia: Western Papua (New Guinea): Moluccas" (Holotype or syntypes: ♂, ZIN).

Notogonidea luzonensis Rohwer, 1919: 9, ♀, "Philippines: Luzon: Los Baños" (Holotype: ♀, USNM).

Liris vortex Tsuneki, 1966g: 7, ♂, "Taiwan: Nantou Prefecture: Nanshanchi" (Holotype: ♂, KUEC).

SPECIMENS EXAMINED: VIETNAM: Ha Noi: 1♀, Xuan Mai, Hoa Binh (Ha Noi currently), 15.iii.2010, Coll. Ph.H. Pham; 1♀, Mieu Mon, Chuong My, 18.ix.2017, Coll. Ph.H. Pham; 1♀, My Dinh, Bac Tu Liem, 18.xi.2015, Coll. Ph.H. Pham; 1♂, Da Ton, Gia Lam, 5–15.xi.2001, Malaise trap, Coll. K.D. Long; 1♀, 1♂, Bai giau Song Hong, Long Bien, 4.v.2017, 30.v.2017, Coll. H.T. Dang; 1♀, 5♂, Van Hoa, Ba Vi, 8.i.2020, Coll. Ph.H. Pham; 1♂, Ba Vi National Park, Ba Vi, 10.vii.2016, Coll. Ph.H. Pham; 2♀, 2♂, Co Nhue, Bac Tu Liem, 5.i.2016, 7.v.2016, Coll. Ph.H. Pham; 3♂, Hoa Lac, Thach That, Ha Tay (Ha Noi currently), 5–21.ii.2002, Malaise trap, Tea garden, Coll. K.D. Long; 2♀, 2♂, Lien Mac, Bac Tu Liem, 19.viii.2017, 15.x.2017, 24.xi.2018, Coll. Ph.H. Pham; 2♀, Nghia Do, Cau Giay, 4.i.2016, Coll. Ph.H. Pham. Thai Binh: 2♂, Dong Hoang, Tien Hai, 30.vii.2018, Coll. Ph.H. Pham; 1♀, Hong Minh, Hung Ha, 16.vii.2016, Coll. Ph.H. Pham. Hoa Binh: 2♂, My Tan, Tan Thanh, Luong Son, 27.v–27.vi.2019, Malaise trap, Coll. Ph.H. Pham; 2♂, Tan Lac, Yen Thuy, 3.viii.2017, Coll. Ph.H. Pham; 1♀, Hang Kia, Mai Chau, 22.x.2018, Coll. Ph.H. Pham; 4♂, Da Phuc, Yen Thuy, 20–30.iv.2003, 20–30.x.2002, Malaise trap, Coll. K.D. Long; 1♀, 3♂, Ban Lac, Mai Chau town, Mai Chau, 12.vi.2018, Coll. Ph.H. Pham; 1♂, Bao Hieu, Yen Thuy, 13.v.2003, Coll. K.D. Long. Son La: 1♂, Xuan Nha, Van Ho, 15.vi.2018, Coll. Ph.H. Pham; 1♂, Copia Nature Reserve, Thuan Chau, 15.v.2017, >1000 m, Coll. Ph.H. Pham; 2♂, Nong Truong, Moc Chau, 7.vi.2019, Coll. Ph.H. Pham; 3♂, Son La city, 1–10.v.2017, 1–10.vi.2017, 1–10.viii.2017, Malaise trap, Coll. K.D. Long; 5♂, Ban Chieu, Muong Thai, Phu Yen, 10–11.viii.2017, Coll. Ph.H. Pham; 1♂, Kho Hong, Chieng Xuan, Van Ho, 26.viii.2018, Coll. Ph.H. Pham. Thai Nguyen: 1♀, 1♂, Phu Luong, 20.xii.2006, 15.iv.2017, Coll. H.T. Dang. Vinh Phuc: 2♂, Me Linh Station for Biodiversity, Me Linh, 1–3.vi.2018, Coll. Ph.H. Pham.

DISTRIBUTION. India, Myanmar, Sri Lanka, Philippines, Iraq, Indonesia, China, Iran, Malaysia, Japan, Thailand, Hawaii Islands, Cocos Island, Taiwan, Afghanistan, Kazakhstan, Papua New Guinea, Bangladesh, Korea, Vietnam: Ha Noi, Thai Binh, Son La, Thai Nguyen, Vinh Phuc, Hoa Binh.

REMARKS. Both colour types of *L. subtessellatus* in Vietnam are recorded. The first type is of the black hind femur and the second type is of the red hind femur.

Genus *Tachysphex* Kohl, 1883

1. *Tachysphex changi* Tsuneki, 1967

Tachysphex changi Tsuneki, 1967: 53, ♂, ♀, "Taiwan: Chiayi Prefecture: Chuchi" (Holotype: ♂, originally K. Tsuneki coll., now USNM).

Tachysphex nambui Tsuneki, 1973: 5, ♀, "Ryukyu Islands: Iriomote Island: Komi" (Holotype: ♀, T. Nambu collection). Synonymized with *Tachysphex changi* by Tsuneki, 1983: 60.

DISTRIBUTION. Sri Lanka, India, Laos, Thailand, Malaysia, Philippines, Taiwan, Japan, Vietnam: 24 km E Dilinh (1♀, Bernice P. Bishop Museum, Honolulu, Hawaii) (= Di Linh District currently, Lam Dong Province) [Krombein, Pulawski, 1994].

2. *Tachysphex puncticeps* Cameron, 1903

Tachysphex puncticeps Cameron, 1903: 127, ♀, "India: West Bengal: Barrackpore 20 Km north of Calcutta" (holotype: ♀, OXUM).

Tachysphex varihirtus Cameron, 1903: 128, ♂, "India: West Bengal: Barrackpore 20 Km north of Calcutta" (holotype or syntypes: ♂, OXUM).

Tachysphex rugidorsatus Turner, 1915: 556, ♀, "Australia: Tasmania: Eaglehawk Neck" (Lectotype: ♀, BMNH).

Tachysphex mindorensis Williams, 1928: 92, ♂, ♀, "Philippines: Island of Mindoro: San Jose" (holotype: ♂, BPBM).

DISTRIBUTION. India, Thailand, Laos, Philippines, Malaysia, Taiwan, New Guinea, Australia, Vietnam: Da Nang [Krombein, Pulawski, 1994], Hoa Binh [Pham, 2019b].

Tribe Trypoxylini

Genus *Trypoxylon* Latreille, 1796

1. *Trypoxylon maculipes* Tsuneki, 1979

Trypoxylon maculipes Tsuneki, 1979: 25, ♀, ♂, "Laos: Wapikhamthong Province: Wapi" (Holotype: ♂, BPBM).

DISTRIBUTION. China, Laos, Vietnam: Gia Lai (50 Km SW of Pliku (= Pleiku)) [Tsuneki, 1979].

2. *Trypoxylon petiolatum* F. Smith, 1858

Trypoxylon petiolatum F. Smith, 1858: 105, ♀, "Malaysia: Sarawak" (lectotype: ♀, OXUM).

Trypoxylon rejector F. Smith, 1870: 189, ♀, "India: North-West Provinces, now Uttar Pradesh: Mainpuri" (holotype or syntypes, lost?).

Trypoxylon obsonator F. Smith, 1873: 194, ♀, ♂, "Japan: Hyogo" (syntypes, BMNH).

Trypoxylon accumulator F. Smith, 1875: 38, ♀, "India: no specific locality" (lectotype: ♀, OXUM).

Trypoxylon javanum Taschenberg, 1875: 378, ♂, "Indonesia: Java, no specific locality" (holotype: ♂, MLUH).

Trypoxylon tinctipenne Cameron, 1889: 121, ♀, ♂, "India: West Bengal, Barrackpore 20 km N Calcutta" (lectotype: ♂, OXUM).

Trypoxylon tricolor Sickmann, 1894: 209, ♀, "China: Hopei Province, Tientsin" (holotype or syntype: ♀, Munster).

Trypoxylon cognatum Cameron, 1897: 26, ♀, "India: Himalaya, no specific locality" (holotype: ♀, OXUM).

Trypoxylon erythrozonatum Cameron, 1901: 54, ♀, "Maldives Islands" (lectotype: ♀, BMNH).

Trypoxylon responsum Nurse, 1903: 518, ♀, "India: Rajasthan, Mount Abu" (syntypes: ♀, BMNH).

Trypoxylon obsonator tropicale Tsuneki, 1961: 383, ♀, ♂, "Thailand: Chiang Mai" (holotype: ♂, UOPJ)

DISTRIBUTION. Singapore, Malaysia, Thailand, Laos, Myanmar, China, Nepal, Maldives Island, Vietnam: Dak Nong (Dak Song district) [Tsuneki, 1979].

REMARKS. Pham et al. [2015] showed the *T. petiolatum* distribution in Vietnam based on an electrical list of the genus produced by Pulawski [2015], but did not mention the specific locality of the distribution (provincial level). Therefore, we list in the present study the species and give its specifically distributional locality.

3. *Trypoxylon prominens* Tsuneki, 1979 ?

Trypoxylon prominens Tsuneki, 1979:149, ♀, ♂, “Laos: Vientiane Province: Gi Sion Vill. de Tha Ngone (Holotype: ♀, BPBM).

DISTRIBUTION. India, Laos, Malaysia, Indonesia, Vietnam [Tsuneki, 1979].

REMARKS. In a key to *Trypoxylon* species, Tsuneki [1979] mentioned the species distributed in Vietnam, but did not give Vietnamese specimens examined in the description section (p. 149). Therefore, we put here a question mark behind the species name.

4. *Trypoxylon pygmaeum* Cameron, 1900

Trypoxylon pygmaeum Cameron, 1900: 79, “♀” = ♂, “India: Bengal: Barrackpore” (Holotype: ♂, OXUM).

DISTRIBUTION. India, Laos, Sri Lanka, Vietnam: Pleiku (30 Km NW of Pleiku) [Tsuneki, 1979].

REMARKS. Pham et al. [2015] showed the *T. pygmaeum* distribution in Vietnam based on the electrical list of the genus produced by Pulawski [2015], but did not mention the specific locality of distribution (provincial level). Consequently, we list here the species and show its specifically distributional locality.

5. *Trypoxylon schmiedeknechti* Kohl, 1906

Trypoxylon schmiedeknechti Kohl, 1906a:202, ♂ (as *schmiedeknechti*, incorrect original capitalization), “Indonesia: Java: no specific locality” (Syntypes: NHMW).

Trypoxylon pileatum var. *subpileatum* Strand, 1922b:163, ♀, ♂, “Taiwan: Kankau, now Hengchun” (Lectotype: ♀, DEI)

Trypoxylon chinense Gussakovskij, 1936:648, ♀, “China: Tientsin” (Holotype: ♀, ZIN).

DISTRIBUTION. Philippines, Singapore, Thailand, Cambodia, Laos, India, Nepal, Sri Lanka, Taiwan, Myanmar, Brunei, Japan, Indonesia, China, Vietnam: Dong Nai (Trang Bom, 30 miles NW of Sai Gon) [Tsuneki, 1978, 1979].

6. *Trypoxylon sextum* Tsuneki, 1979

Trypoxylon sextum Tsuneki, 1979: 59, ♂, “Malaysia: Perak: Larut Hills” (Holotype: ♂, BMNH).

DISTRIBUTION. Malaysia, Vietnam: Fian (= Don Duong district currently, Lam Dong province) [Tsuneki, 1979].

Tribe Miscophini

Genus *Lyroda* Say, 1837

1. *Lyroda formosa* F. Smith, 1858

Morphota formosa F. Smith, 1858: 17, ♀, “Indonesia: Sulawesi (as Celebes): no specific locality” (Holotype or Syntype: ♀, BMNH).

Odontolarra rufiventris Cameron, 1900: 36, ♀, “India: Assam: Khasia” (Holotype or syntypes: ♀, OXUM).

DISTRIBUTION. Bangladesh, Cambodia, Thailand, Oman, Indonesia, Burma, India, Philippines, Taiwan, New Guinea, China, Arabia, Solomon Islands, Vietnam: Chu Dak, Krong Bong, Dak Lak [Schmid-Egger, Al-Jahdhami, 2021].

Subfamily Philanthinae

Tribe CERCERINI

Genus *Cerceris* Latreille, 1802

1. *Cerceris bituberculata* Tsuneki, 1963

Cerceris bituberculata Tsuneki, 1963: 29, ♀, ♂, “Thailand: Muangfang” (Holotype: ♀, Sasayama University).

DISTRIBUTION. Thailand, Vietnam: Bac Giang (Tay Yen Tu Nature Reserve) [Dollfuss, 2020].

Acknowledgements. We thank Assoc. Prof. Khuat Dang Long and Mrs. Dang Thi Hoa for supporting several speci-

mens of the present study. The authors are grateful to Dr. Wojciech J. Pulawski, California Academy of Science, San Francisco, USA for identifying three species of the genus *Liris*.

Competing interests. The authors declare no competing interests.

References

- Barthélémy C. 2014. Provisional distributional checklist of Hong Kong Sphecidae (Apoidae) // Downloaded from Internet on May 25, 2015 at [http://hkentsoc.org/bulletin/HKEB6\(2\)_Barthelemy_Sphecidae.pdf](http://hkentsoc.org/bulletin/HKEB6(2)_Barthelemy_Sphecidae.pdf).
- Berland L. 1928. Les Sphegidae (Hyménoptères) du muséum national de Paris // Bulletin du Muséum National d'Histoire Naturelle. Vol.34. P.329–331.
- Četković A., Mokrousov M.V., Plečaš M., Bogusch P., Antić D., Ćorović-Jovanović L., Krpo-Četković J., Karaman M. 2011. Status of the potentially invasive Asian species *Sceliphron deforme* in Europe, and an update on the distribution of *S. curvatum* (Hymenoptera: Sphecidae) // Acta Entomologica Serbica. Vol.16. No.1&2. P.91–114.
- Dollfuss H. 2008. The Sphecini wasps of the genera *Chilosphex* Bohart & Menke, *Isodontia* Patton, *Palmodes* Kohl, *Prionyx* Vander Linden and *Sphex* Linnaeus of the “Biologiezentrum Linz” collection in Linz, Austria, (Hymenoptera, Apoidea, Sphecidae) // Linzer Biologische Beiträge. Vol.40. P.1399–1434.
- Dollfuss H. 2016. The Chloriontinae, Sceliphrinae and Sphecinae wasps of the “Biologiezentrum Linz”-collection in Linz, Austria including the genera *Chalybion* Dahlbom, *Chlorton* Latreille, *Dynatus* Lepeletier de Saint Fargeau, *Penepodium* Menke, *Podium* Fabricius, *Sceliphron* Klug, *Stangeella* Menke and *Trigonopsis* Perty (Hymenoptera, Apoidea, Sphecidae) and description of the new species *Chalybion ohli* from Madagascar // Linzer Biologische Beiträge. Vol.48. P.1149–1185.
- Dollfuss H. 2017. The Ampulicidae Wasps of the “Biologiezentrum-Linz”- Collection in Linz, Austria, including the Genera *Ampulex* Jurine, *Dolichurus* Latreille and *Trirogma* Westwood (Hymenoptera, Apoidea, Ampulicidae) // Linzer Biologische Beiträge. Vol.49. No.1. P.441–457.
- Dollfuss H. 2020. The Sphecid Wasps of the genus *Cerceris* Latreille, 1802 of the “Biologiezentrum Linz”-Collection in Linz, Austria, from the Oriental Region (Hymenoptera, Apoidea, Crabronidae) // Linzer Biologische Beiträge. Vol.52. No.1. P.119–125.
- Hensen R.V. 1987. Revision of the subgenus *Prosceliphron* van der Vecht (Hymenoptera, Sphecidae) // Tijdschrift voor Entomologie. Vol.129. P.217–261.
- Hensen R.V. 1991. Review of Malesian Sphecina (Hymenoptera, Sphecidae, Sphecinae) // Tijdschrift voor Entomologie. Vol.134. P.9–30.
- Kohl F.F. 1885. Die Gattungen und Arten der Larriden Autorum [sic] // Verhandlungen der kaiserlich-königlichen Zoologisch-Botanischen Gesellschaft in Wien. Bdl.34. S.171–268, pls. VIII–IX. 327–454, pls. XI–XII.
- Krombein K.V., Pulawski W.J. 1994. Biosystematic studies of Ceylonese wasps, XX: A revision of *Tachysphex* Kohl, 1883, with notes on other oriental species (Hymenoptera: Sphecidae: Larrinae). Washington D.C., USA: Smithsonian Institution Press. 114 pp.
- Li T., Cai W., Li Q. 2009. Three new species and one new record of *Liris* Fabricius (Hymenoptera: Crabronidae) from China, with a key to the Palearctic species // Entomologica Fennica. Vol.20. P.111–120.
- Pham Ph.H. 2016a. Taxonomic notes of the genus *Sceliphron* Klug (Hymenoptera: Sphecidae) from Northern Vietnam, with description of a new species // Turkish Journal of Zoology. Vol.40. No.5. P.686–690. doi:10.3906/zoo-1511-18.
- Pham Ph.H. 2016b. A new species of the genus *Isodontia* Patton (Hymenoptera: Sphecidae) from Vietnam // Acta Musei Mora-

- viae, *Scientiae Biologicae* (Brno). Vol.101. No.1. P.63–68.
- Pham Ph.H. 2018. *Chalybion bengalense* (Dahlbom, 1845) (Hymenoptera: Sphecidae) first reported in North Vietnam // *Linzer Biologische Beiträge*. Vol.50. No.1. P.681–685.
- Pham Ph.H. 2019a. The nesting habits of *Chalybion bengalense* (Dahlbom) (Hymenoptera: Sphecidae) // *Oriental Insects*. Vol.53. No.3. P.1–11. <https://doi.org/10.1080/00305316.2019.1624220>
- Pham Ph.H. 2019b. The nesting biology of *Tachysphex puncticeps* Cameron, 1903 (Hymenoptera: Crabronidae) // *Entomological News*. Vol.128. No.2. P.211–216. <https://doi.org/10.3157/021.128.0201>
- Pham Ph.H., Girish Kumar P., Danilov Y.N. 2015. Distributional checklist of sphecid wasps (Hymenoptera: Ampulicidae, Sphecidae, Crabronidae) from Vietnam // *Linzer Biologische Beiträge*. Vol.47. P.1581–1599.
- Pham Ph.H., Dang T.H. 2017. New record of the mud dauber wasp *Chalybion malignum* (Kohl, 1906) (Hymenoptera: Sphecidae) from Vietnam with the first information on its nesting biology // *Punjab University Journal of Zoology*. Vol.32. No.1. P.155–158.
- Pham Ph.H., Truong X.L., Nguyen T.T.A., Nguyen T.H., Nguyen Q.C., Nguyen T.M. 2019a. Species composition and distribution of sphecid wasps (Hymenoptera: Sphecidae) in Ha Noi and its vicinity // *Tap Chi Sinh Hoc*. Vol.41. No.2. P.71–77. <http://doi.org/10.15625/0866-7160/v41n2se1&2se2.14165>
- Pham Ph.H., Ohl M., Truong X.L. 2019b. The genus *Chalybion* Dahlbom, 1843 (Hymenoptera: Sphecidae) from Northwest Vietnam, with description of a new species // *Zootaxa*. Vol.4712. No.2. P.202–210. <http://doi.org/10.11646/zootaxa.4712.2.2>
- Pham Ph.H., Nguyen T.T.A., Nguyen Q.C., Nguyen T.M., Dang T.H., Nguyen D.H., Tran T.N., Nguyen T.D., Pham V.P. 2020. Solitary wasps of the family Sphecidae (Hymenoptera: Apoidea) in Hoa Binh, Vietnam // *Proceedings of the 10th Vietnam National Conference on Entomology*. Agriculture Publishing House, P.228–234.
- Pulawski W.J. 2015. Catalog of Sphecidae sensu lato (= Apoidea excluding Apidae sensu lato) (= Heterogynaidae, Ampulicidae, Sphecidae sensu stricto, and Crabronidae) (accessed May 2015). Available from: <https://calacademy.org/scientists/projects/catalog-of-sphécidae>.
- Pulawski W.J. 2021. Catalog of Sphecidae sensu lato (= Apoidea excluding Apidae sensu lato) (= Heterogynaidae, Ampulicidae, Sphecidae sensu stricto, and Crabronidae) (accessed 19 April 2021). Available from: <https://calacademy.org/scientists/projects/catalog-of-sphécidae>.
- Schmid-Egger C., Al-Jahdham A. 2021. The genus *Lyroda* Say, 1837 in Africa and Arabian Peninsula with description of two new species (Hymenoptera, Crabronidae) // *Zootaxa*. Vol.4915. No.2. P.273–281. <https://doi.org/10.11646/zootaxa.4915.2.7>
- Tano T., Kurokawa H. 2015. The wasps and bees collected in central part of Vietnam // *Tsunekibachi*. Vol.27. P.25–30.
- Terayama M., Tano T., Kurokawa H. 2019. A new species of the crabronid wasp genus *Rhopalum* Stephens, 1829, from Vietnam (Hymenoptera: Crabronidae), with a taxonomic note on the genus *Crorhopalum* // *Tsunekibachi*. Vol.33. P.1–5.
- Tsuneki K. 1978. Studies on the genus *Trypoxylon* Latreille of the Oriental and Australian Regions (Hymenoptera, Sphecidae). I. Group of *Trypoxylon scutatum* Chevrier, with some species from Madagascar and the adjacent islands // *Special Publications of the Japan Hymenopterists Association*. Vol.7. P.1–87.
- Tsuneki K. 1979. Studies on the genus *Trypoxylon* Latreille of the Oriental and Australian Regions (Hymenoptera, Sphecidae). III. Species from the Indian subcontinent including southeast Asia // *Special Publications of the Japan Hymenopterists Association*. Vol.9. P.1–178.
- Tsuneki K. 1983. Further studies on the Larrinae of the Philippine Islands, with remarks on the Indian species of the genus *Lyroda* (Hymenoptera, Sphecidae) // *Special Publications of the Japan Hymenopterists Association*. Vol.24. P.1–117.